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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,836	04/13/2004	Kramadhati V. Ravi	42P18240	5533

8791 7590 02/21/2007

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EXAMINER	
GEORGE, PATRICIA ANN	
ART UNIT	PAPER NUMBER
1765	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/823,836	RAVI, KRAMADHATI V.	
	Examiner	Art Unit	
	Patricia A. George	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16, and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Independent claims 1 and 15, and all claims pending from them are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant points to paragraph 18 of their own specification for support for the amendment "greater than about 30 percent defects", however examiner can find no such support in the specification. Claims 2-14, 16, and 18 are pending from claims 1 and 15, therefore are also rejected.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 3, 6, 7, 8, 10, 11, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (herein refered to as Choi) (Electron energy distribution of diamond-coated field emitters; Journal of Vacuum Science and Technology B: Microelectronics and Nonameter Structures; 3/1998, Vol. 16, issue 2, pp. 716-719) evidenced by: Sokolowska (The structure and mechanical properties of carbon layers formed by crystallization from pulse plasma; Journal of material Science 21 (1986) 763-767), further evidenced by Cagin et al. (Nanotechnology 10 (1999) 278-284; Simulation an experiments on friction and wear of diamond: a material for MEMS and NEMS application) and Ristein (Elsevier Science S.A.; 2000; Diamond and Related Materials 9 1129-1137; Electronic properties of diamond surfaces – blessing or curse for devices?).

Choi at el. teaches a method for coating (i.e. forming a layer) on an emitter (i.e substrate), with a diamond layer; and replacing (i.e. removing) hydrogen (from anneal) with oxygen at internal defects (i.e. heated oxygen as in claim 7) (pg. 718, col. 2, line 14) to change the surface, which indicates removal of a substantial amount (see abstract).

As for pores formed in diamond layers, see Sokolowska et al. for evidence diamond lattice bonds arrange disorderly, thus structure inherently contains numerous pores of various sizes. (see page 766, section conclusions, last paragraph).

Although Choi et al. is silent as to the range of defects 30 % as applicants' limitation of claim 1, it would have been obvious to one of ordinary skill in the art at the

time of invention was made, to select any desired range of defects, including applicant specifically claimed range of about 30 %, because Choi et al.'s silence as to the quantity of defects renders an absence of a showing of critically for this parameter. Further one skilled in the art would have found it obvious that Choi's methods cure such known defects, therefore the quatity is not critical. One skilled in the art would also have found it obvious that such an absence of criticality would allow for any desired amount of defects to be selected, through experimentation.

As for claim 2, Choi teaches enhanced electron emissivity (i.e. reducing the dielectric constant) (see abstract).

With respect to claim respect to claim 3, Choi teaches the diamond layer is formed by chemical vapor deposition (see (pg. 718, col. 2, line 5).

As to claim 6, wherein the diamond layer comprises vacancies, please see discussion toward claim 1 (i.e. pores).

With respect to claim respect to claim 7, please see discussion toward wherein removing, above: where Choi teaches removing hydrogen, from anneal with oxygen from internal defects (i.e. heated oxygen as in claim 7) (pg. 718, col. 2, line 14).

With respect to claim respect to claim 8, Choi teaches exposing to oxygen gas at room temperature (see, which is below about 450 degrees Celsius, as applicant claims.

With respect to claim respect to claim 10, Choi teaches etching the defects comprises exposing the defects to hydrogen and oxygen plasmas (see abstract).

As to claim 11, Choi teaches the hydrogen plasma treatment provides passivation (see abstract), which inherenty reduces the coefficient of friction of a top surface of the diamond layer, evidenced by Cagin et al. (see abstract).

As to claim 15, Choi teaches a first diamond layer which inherently comprises a mixture of sp2 bonds and sp3 bonds (see evidence in Nature of Carbon Bonding, pg. 8 and 10); and inherently removes the sp2 bonds on the surface (evidenced by Ristein, see abstract).

As to claim 17, see discussion toward claim 15.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4-5, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. in view of Catledge et al. (High density plasma processing of nanostructured diamond films on metals; Journal of Applied Physics, Vol. 84, No. 11; Dec. 1998)

Choi is silent as to the process parameters of the forming of the diamond layer, such as: to use a concentration of hydrogen that comprises above 10% methane, as in claims 4 and 5; and using a plasma, as in claim 16.

Catledge et al. teaches is well known to use a concentration of hydrogen that comprises 5-15% methane, as in claims 4 and 5; and using a plasma, as in claim 16 (see abstract).

Since Choi does not limit the gas concentraton used for coating a diamond layer, it would have been obvious to one of ordinary skill in the art at the time of invention was made, to include the process parameters for CVD-diamond films, as Catledge et al., when performing the method of coating, as Choi, because Catledge et al. teaches the mechanical properties and adhesions of these films make them very attractive for a variety of applications (see abstract).

Although, Choi is silent as to forming a second diamond layer, as in claim 18, it would have been obvious to one of ordinary skill in the art at the time of invention was made, to use the method of forming the diamond layer, as Choi, to form the second diamond layer, as applicant's claimed limitation, because Choi teaches a method that is shown to be effective and has manufacturability.

Claim Rejections - 35 USC § 103

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. in view of applicant's admitted prior art.

Although Choi teaches oxygen anneal process, Choi is silent as to using an RTP.

Applicant states "Another oxidation process that may be used is utilizing molecular oxygen and a rapid thermal processing apparatus, as is well known in the art." (see para. 20).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include the well known use of RTP, as in applicant's specification, when performing an oxygen anneal process, as Choi, because applicant's teach it is well known in the art.

Claim Rejections - 35 USC § 103

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. in view of Gasworth (5,516,554).

As to claims 12, Choi is silent as to the forming a diamond layer deposition chamber of a cluster tool.

Gasworth (5,516,554) teaches forming a diamond layer in a deposition chamber of a cluster tool (col.3, lines 45-55).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include the use of a cluster tool, as Gasworth, to form a diamond layer, as in Choi, because Gasworth teaches it will allow a design for maximum growth rate With respect to claim minimum gasification time (col.3, lines 45-55).

Claim Rejections - 35 USC § 103

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. in view of White et al. (6,231,716).

Choi et al. is silent as to the oxidation chamber being part of a cluster tool, as in claim 13.

White teaches oxidation (col. 1, lines 10-15) may occur in the RTP Centura (col. 12, lines 17-25).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to use a cluster tool for the deposition and oxidation steps of applicant's instant invention, when performing the method of coating diamond layer, as Choi et al., because White teaches the said configuration is made readily available by Applied Materials, Inc.

Claim Rejections - 35 USC § 103

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. and Catledge et al., as applied to claims 4-5, 16, and 18 above, further in view of Gasworth, as applied to claim 12 above, and White et al. as applied to claim 13 above.

Claim 14 please see discussions toward claims 12, 13, and 18 above.

Response to Arguments

Applicants remarks, on page 7 – 10, toward the prior rejection not disclosing the amended limitation of "greater than 30 percent defects", examiner agree. Please see the art rejection above.

Applicant admits the amended of claim 7 are well known in the art, in para. 21 of applicants specification.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571)272-5955. The examiner can normally be reached on weekdays between 7:00am and 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571)272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Patricia A George
Examiner
Art Unit 1765

PAG 02/07

NADINE G. NORTON
SUPERVISORY PATENT EXAMINER